

UNITED STATES PATENT AND TRADEMARK OFFICE
DOCUMENT CLASSIFICATION BARCODE SHEET



CATEGORY:

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CONTACT IF FOUND:

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371

1200.414

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

09/700877

INTERNATIONAL APPLICATION NO.
PCT/FR00/00650INTERNATIONAL FILING DATE
17 March 2000PRIORITY DATE CLAIMED
22 March 1999

TITLE OF INVENTION

ROTATING MACHINE COMPRISING MAGNETS WITH DIFFERENT COMPOSITIONS

APPLICANT(S) FOR DO/EO/US

AKEMAKOU Dokou, Antonie

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
 - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☒ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ A copy of the International Search Report (PCT/ISA/210).
8. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

Items 13 to 20 below concern document(s) or information included:

13. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☐ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ Certificate of Mailing by Express Mail
20. ☒ Other items or information:

PCT/RO 125

4 Cited References

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
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1200.414

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

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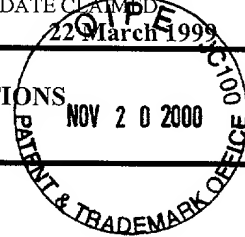
INTERNATIONAL APPLICATION NO.
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 - b. ☐ have been transmitted by the International Bureau.
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- ☒ Other items or information:

PCT/RO 125

4 Cited References

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 09/700877)	INTERNATIONAL APPLICATION NO. PCT/FR00/00650	ATTORNEY'S DOCKET NUMBER 1200.414
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21. The following fees are submitted:.				CALCULATIONS PTO USE ONLY	
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :					
<input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO				\$970.00	
<input checked="" type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO				\$840.00	
<input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO				\$690.00	
<input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4)				\$670.00	
<input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4)				\$96.00	
ENTER APPROPRIATE BASIC FEE AMOUNT =				\$840.00	
Surcharge of \$130.00 for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492 (e)). <input type="checkbox"/> 20 <input type="checkbox"/> 30				\$0.00	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	8 - 20 =	0	x \$18.00	\$0.00	
Independent claims	1 - 3 =	0	x \$78.00	\$0.00	
Multiple Dependent Claims (check if applicable).				<input type="checkbox"/> \$0.00	
TOTAL OF ABOVE CALCULATIONS =				\$840.00	
Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) (check if applicable).				<input type="checkbox"/> \$0.00	
SUBTOTAL =				\$840.00	
Processing fee of \$130.00 for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492 (f)).				<input type="checkbox"/> 20 <input type="checkbox"/> 30 + \$0.00	
TOTAL NATIONAL FEE =				\$840.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable).				<input checked="" type="checkbox"/> \$40.00	
TOTAL FEES ENCLOSED =				\$880.00	
				Amount to be: refunded	\$
				charged	\$

- ☒ A check in the amount of **\$880.00** to cover the above fees is enclosed.
- ☐ Please charge my Deposit Account No. _____ in the amount of _____ to cover the above fees.
A duplicate copy of this sheet is enclosed.
- ☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **50-0548** A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Liniak, Berenato, Longacre & White
6550 Rock Spring Drive
Suite 240
Bethesda, Maryland 20817
(301)896-0600


 SIGNATURE

Matthew F. Johnston

NAME

41,096

REGISTRATION NUMBER

November 20, 2000

DATE

INTERNATIONAL PATENT APPLICATION NO. PCT/FR00/00650**A ROTARY MACHINE HAVING MAGNETS OF DIFFERENT COMPOSITIONS**

5 The present invention relates in general terms to rotary electrical machines.

More precisely, the invention relates to rotary machines which incorporate permanent magnets integrated into the rotor or stator of the machine.

Numerous embodiments of such machines exist.

10 In these known forms of construction, the magnets are generally made exclusively of ferrite, or they all contain rare earths.

Each of these two types of magnets has certain specific advantages:

15 - for equal performance, the magnets that contain rare earths are more compact, which enables the machines to be accommodated in a smaller space,

- on the other hand, ferrite magnets lead to greater bulk. However, the cost of these magnets is substantially less than that of the magnets that contain rare earths, the use of which raises the selling price of the machine.

20 According to the requirements and objectives as to size and cost linked to the design of a rotary machine, either ferrite magnets or magnets containing rare earths will therefore be selected for incorporation in the machine.

25 In the document JP-A-57 097 357 a rotary machine was disclosed which combined the advantages quoted above in connection with the two respective types of magnets currently used in rotary machines.

30 In that document, N (north) and S (south) magnets are disposed alternately around the axis of rotation of the rotor of the electrical machine. These N and S magnets are surface mounted, and produce a flux which is essentially radial as in Figures 1a, 1b, 1c, 1d.

It can be desirable to optimise this combination even more, in particular so as to obtain a further reduction in costs.

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With this object in view, the invention proposes a rotary electrical machine, especially an alternator or an alternator-starter for a motor vehicle, comprising a stator, a rotor, an airgap between the stator and the rotor, and permanent magnets incorporated in the rotor and/or in the stator, wherein the magnets constitute at least two groups each of which is defined by a specific type of composition, namely a first group of magnets containing rare earths and a second group consisting of ferrite magnets, characterised in that a plurality of sub-assemblies is provided, each sub-assembly combining a magnet of the first group with at least one magnet of the second group, at least one of the magnets being disposed radially so as to generate an orthoradial magnetic flux.

The term orthoradial is to be understood here to mean that the flux generated by the permanent magnet concerned is at right angles to a radial direction.

Thanks to the invention, an increased concentration of magnetic fluxes is obtained, which enables the volume of the rare earth magnets, and therefore costs, to be reduced even more, while increasing the performance of the machine.

Preferred but not limiting aspects of the rotary electrical machine according to the invention are as follows:

- in order to generate a magnetic flux in a generally orthoradial direction, each sub-assembly comprises a magnet containing rare earths, surrounded by two ferrite magnets;
- a plurality of sub-assemblies of magnets are provided inside the rotor, each sub-assembly combining at least one magnet of the first group with at least one magnet of the second group;
- each sub-assembly comprises a magnet containing rare earths situated close to the airgap, arranged in superimposed relationship in a generally radial direction with a ferrite magnet;
- each sub-assembly comprises a magnet containing rare earths situated close to the airgap and in superimposed relationship in a generally radial direction with a ferrite magnet of the same thickness as the rare earth magnet, the said ferrite magnet including indexing means, in particular a chamfered portion or a notch.

Further aspects, objects and advantages of the invention will appear more clearly on a reading of the following detailed description of

preferred embodiments of the invention, which is given with reference to the attached drawings, in which:

- Figures 1a to 1d are four diagrammatic representations of a known first way of locating magnets in a rotary machine,
- 5 - Figures 2a to 2c are three diagrammatic representations of a known second way of locating magnets in a rotary machine,
- Figure 3 is a diagrammatic representation of a variant of the known second way of locating magnets in a rotary machine,
- Figures 4a to 4c are three diagrammatic representations shown, respectively, a known way of locating a surface magnet with orthoradial flux, and two other versions of the first way of locating magnets in a rotary machine according to the invention, generating a substantially equivalent orthoradial flux,
- 10 - Figure 5 is a diagrammatic representation of part of a rotary machine according to the invention, which incorporates magnets which are fitted in accordance with a first embodiment of the invention,
- Figures 6a and 6b are two detail views showing, respectively, two further versions of the configuration of the magnets in a machine similar to that in Figure 5,
- 15 - Figure 7 is a partial view showing the fitting of magnets in a stator.

With reference to Figures 1a to 3, the three principal known ways of locating magnets in a rotary electrical machine will now be briefly described. In the examples given below, the magnets are integrated into the rotor of the machine; however, it is also possible to make use of known ways of fitting magnets by incorporating magnets in the stator of the machine.

Figures 1a to 1d show four configurations in which the North magnet N and South magnet S are disposed alternately around the axis of rotation of the rotor. In a first type of configuration, the magnets produce an essentially radial flux. In Figures 1a and 1b, the North magnet N and South magnet S are surface magnets, while in the configurations in Figures 1c and 1d they are inset.

As to Figures 2a and 2b, these show three configurations which give an essentially orthoradial magnetic flux. It will be noted that in the embodiment in Figure 2c, the rotor is provided with excitation windings 20 which are fed via brushes (not shown).

Finally, it is possible to omit the windings 20 of Figure 2c, and, as described in the document FR 98 13119 filed on 20 October 1998, to arrange the magnets radially in such a way as to give rise to magnetic fluxes which are all in the same direction, for example the clockwise
5 direction, the magnets being arranged alternately with cavities which are impermeable to magnetic flux.

Figures 2a to 3 show, by means of arrows, the directions of the magnetic fluxes.

There is of course a potentially limitless number of configurations for
10 the magnets, derived from the main ways of locating them described above.

As has been said, existing machines make use either of ferrite magnets, or of magnets which contain rare earths. In order to enable rotary machines to be made which have at the same time a selling
15 price lower than that of machines which make use exclusively of magnets containing rare earths, and which are of a size which is smaller than that of machines with ferrite magnets, an essential characteristic of the invention consists in incorporating in a rotary machine a suitable combination of magnets of different compositions
20 (ferrite and rare earths).

Such a combination must enable the cost and performance considerations to be reconciled to the best advantage.

It is also a major aspect of the invention that such a combination of magnets of different compositions is not substantially detrimental to
25 the performance of the machine in terms of magnetic noise, due to the creation of "magnetic imbalances". Accordingly, it will be seen later herein that the preferred combinations in accordance with the invention protect the machine from excessive magnetic noise by virtue of careful distribution of the magnets about the axis of rotation of the
30 rotor.

In the remainder of this text, generally preferred solutions will be described in which magnets of different compositions are efficiently combined. In the interests of clarity, Figures 4a to 7 show magnets of the ferrite type hatched, whereas those magnets that include rare
35 earths are shown blank.

A first general solution according to the invention consists in replacing each magnet individually by a suitable combination of a plurality of magnets of different compositions.

The rotary electrical machine includes, in the known way, a rotor R, a stator S (Figure 5) and an airgap E between the rotor and the stator. The rotor is carried by a shaft which defines the axis of the rotor.

5 More precisely, it is possible in accordance with the invention to replace a ferrite magnet 70 inset within the rotor and contributing to the production of an orthoradial flux, that is to say a flux which is at right angles to a radial direction, such as is shown in Figure 4a by:

10 - an inset ferrite magnet 720 situated close to the shaft of the rotor and arranged in radially superimposed relationship with a second magnet 721 which contains rare earths, and which is located close to the airgap and therefore to the outer surface of the rotor, so that a magnetic flux is efficiently set up with the stator. This type of superimposed relationship is shown in Figure 4b, the two magnets being magnetised orthoradially,

15 - or again, by a superimposed arrangement, again in the radial direction, in which a magnet 730 containing rare earths is surrounded by two ferrite magnets 731 and 732 as shown in Figure 4c, the three magnets here again being magnetised orthoradially.

20 In another version and with reference to Figure 2b, the magnet in the second group may be located radially so as to generate an orthoradial magnetic flux, while the magnet in the first group is inclined with respect to a radial direction and constitutes an outward radial extension of the magnet in the second group. The magnets in Figure 2b are replaced by the sub-assemblies according to the invention.

25 In all cases, a plurality of sub-assemblies of permanent magnets is formed, with each sub-assembly combining a permanent magnet of a first group (i.e. those with rare earths) with at least one permanent magnet of the second group (i.e. the ferrite magnets). At least one of the said magnets is oriented radially in order to generate an orthoradial magnetic flux. Magnetisation of the said magnet is therefore
30 orthoradial as shown by the arrows.

Figure 5 shows one embodiment of the invention in a hybrid machine, with double excitation by windings and magnets, of the same type as that described in the document FR 99 02345.

35 The stator S of this machine is of a type known *per se*; in this example the stator is a three-phase stator in which the windings 80 are wound around the teeth of the stator, being mounted within the grooves which separates the teeth from each other. The rotor R in

this example has four combinations of inset magnets corresponding to the representation in Figure 4b: in each of these combinations, a ferrite magnet 800 situated close to the axis of rotation X is superimposed in a radial direction with a second magnet 810 that contains rare earths and is situated close to the airgap of the machine.

The machine shown in Figure 5 thus has better magnetic performance than a machine with orthoradial flux which has only ferrite magnets, and its cost is substantially smaller than that of a machine which makes use only of magnets with rare earths.

With reference to Figures 6a and 6b, these show two further embodiments of magnets to be used in a rotary electrical machine similar to that in Figure 5, in which magnets of different compositions having the same thickness can be used. It is then advantageous to provide indexing means on one of the two magnets, for example on the ferrite magnet, so that the magnets in the two groups are not reversed.

Figure 6a accordingly shows a ferrite magnet 900a in superimposed relationship with a magnet 910 containing rare earths, the ferrite magnet having its end close to the axis of rotation at least partly chamfered (with a chamfer 9000a). In that case, the forms of the laminations of the rotor are adapted so that they are complementary to the geometry of the magnet 900a.

Figure 6b shows a second version, the indexing means here consisting of a notch 9000b, with a projecting element (not shown) penetrating in a complementary manner into the notch.

It is clearly possible to provide any other indexing means within the competence of the person skilled in the art, on one or other of the magnets, in order to prevent reversal of the magnets while they are being introduced into the slots in the rotor.

It will therefore be apparent that a judicious combination of magnets of different compositions in a rotary machine does, in accordance with the invention, enable overall size to be reduced as compared with a machine which only makes use of ferrite magnets, and at the same time enables the selling price of the machine to be substantially reduced as compared with a machine which only has magnets that contain rare earths.

Thus, in that case (Figure 7), the rare earth magnets 810', which are the smaller ones, are fitted close to the airgap E and to the rotor, while the ferrite magnets 800' are buried in the stator.

In Figures 4a to 6b the permanent magnets are disposed radially in such a way that their magnetisation is orthoradial, that is to say at right angles to a radius.

Thus, the combinations of superimposed permanent magnets 800, 801 are arranged alternately with pairs of bundles of excitation windings 26 received in slots 23 separated by projecting poles 25.

As indicated in the document FR 99 02345 mentioned above, a polarity NNN-SSS etc. changes, in the absence of excitation, to a polarity N-S, N-S etc. when the windings 26 of the rotor are excited.

Each of the housings 123 for the permanent magnets terminates internally in a widened aperture 34 of generally curved form, which is

curved backwards at 34a on either side of the magnets 800 so as to optimise the field lines. All of this enables mechanical strength against centrifugal force to be optimised, having regard to the fact that the rare earth magnets are retained in Figures 5 to 6b radially towards the outside by the projecting poles 25 and on the inside by the ferrite magnets.

In Figure 4b, the rare earth magnets are immobilised radially by the ferrite magnets 731, 732, the latter being wider, and the slots being stepped in consequence. The ferrite magnets 731, 732 in this example are magnetised orthoradially and therefore generate orthoradial magnetic fluxes.

As will have been understood, because magnetisation is orthoradial (at right angles to a radius), concentration of the magnetic fluxes reduces the volume of the rare earth magnets much more, and in particular much more than in the configuration in which both types of magnets are surface mounted. In addition, the ferrite magnets are more efficient due to the concentration of the magnetic fluxes in the arrangements described than in a surface mounted configuration.

The magnetic flux can be homogenised at the level of the airgap between the stator and rotor, by adjusting, firstly the ferrite magnets and rare earth magnets, mainly in terms of depth, and secondly, the circumferential distance between the slots 23 and the ferrite magnets, and the flux set up by the ferrite magnets can be equal to that which is developed by the rare earth magnets.

In another version, the arrangements in Figures 4b and 4c can be applied to the magnets in Figure 3 in which the magnets are all oriented clockwise.

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CLAIMS

1. A rotary electrical machine, especially an alternator or an alternator-starter for a motor vehicle, comprising a stator (S), a rotor (R), an airgap (E) between the stator (S) and the rotor (R), and
 5 permanent magnets incorporated in the rotor and/or in the stator, wherein the magnets constitute at least two groups each of which is defined by a specific type of composition, namely a first group of magnets containing rare earths and a second group consisting of ferrite magnets, characterised in that a plurality of sub-assemblies
 10 (720, 721-731, 730, 732-800, 810 ...) is provided, each sub-assembly combining at least one magnet of the first group with a magnet of the second group, at least one of the magnets being disposed radially so as to generate an orthoradial magnetic flux.
2. An electrical machine according to Claim 1, characterised in that a
 15 plurality of sub-assemblies of magnets (720-721, 730-732, 800-810) are provided inside the rotor, each sub-assembly combining at least one magnet of the first group with at least one magnet of the second group, at least one of the said magnets being oriented radially so as to generate an orthoradial magnetic flux.
- 20 3. An electrical machine according to Claim 2, characterised in that each sub-assembly comprises a magnet containing rare earths (721, 810) situated close to the airgap (E), arranged in superimposed relationship in a generally radial direction with a ferrite magnet (720, 800).
- 25 4. An electrical machine according to Claim 2, characterised in that each sub-assembly comprises a magnet containing rare earths (730) in superimposed relationship in a radial direction with two ferrite magnets (731, 732) by which it is encircled.
- 30 5. An electrical machine according to Claim 3 or Claim 4, characterised in that each sub-assembly comprises a magnet containing rare earths (910) situated close to the airgap (E) and in superimposed relationship in a generally radial direction with a ferrite magnet (900a, 900b) of the same thickness as the rare earth magnet, the said ferrite magnet including indexing means, in particular a
 35 chamfered portion (9000a) or a notch (9000b).
6. An electrical machine according to any one of Claims 1 to 5, characterised in that the first group consisting of rare earth magnets is of smaller size than the second group consisting of ferrite magnets.

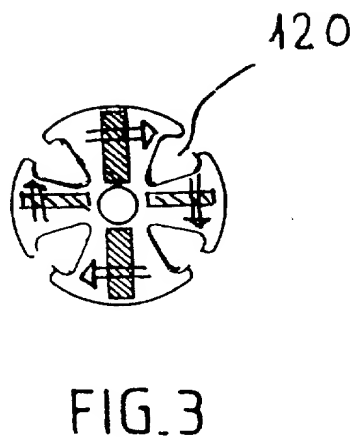
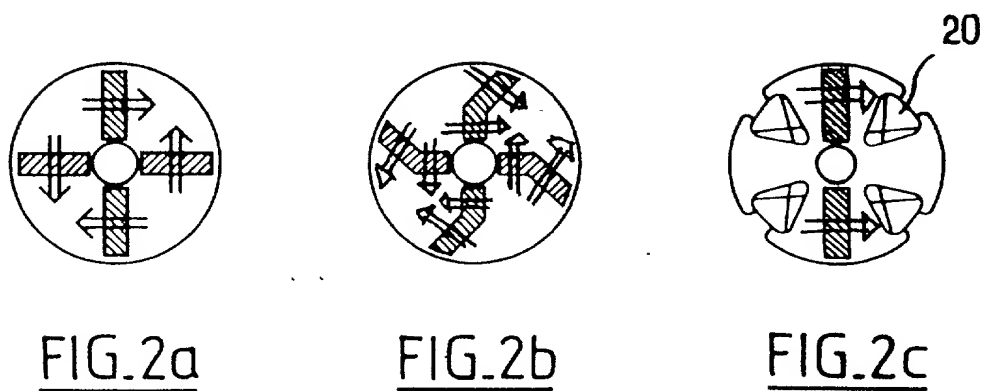
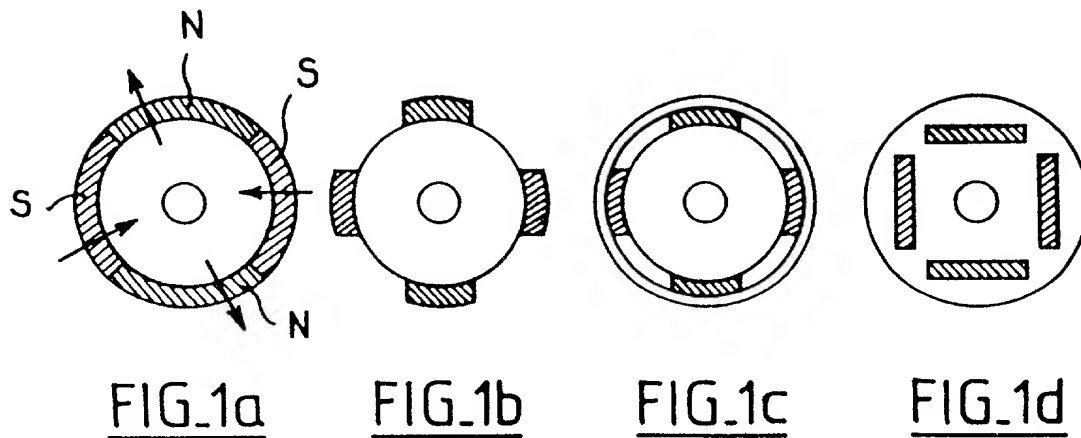
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ABSTRACT**A ROTARY MACHINE HAVING MAGNETS OF DIFFERENT COMPOSITIONS**

5 A rotary electrical machine, especially an alternator or an alternator-starter for a motor vehicle, comprises a stator (S), a rotor (R) and permanent magnets incorporated in the rotor and/or the stator, in which the said magnets are formed into at least two groups each of which is defined by a specific type of composition, with each sub-assembly being a combination of a magnet containing rare earths with
10 a ferrite magnet, at least one of the magnets being arranged radially so as to generate an orthoradial magnetic flux.

15

[Figure 5]



2 / 4

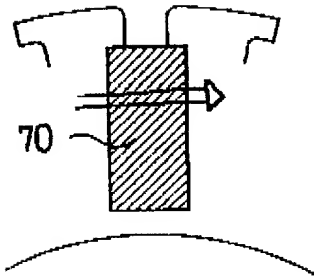


FIG. 4a

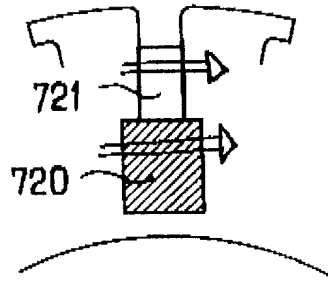


FIG. 4b

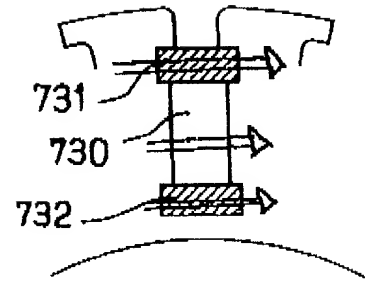


FIG. 4c

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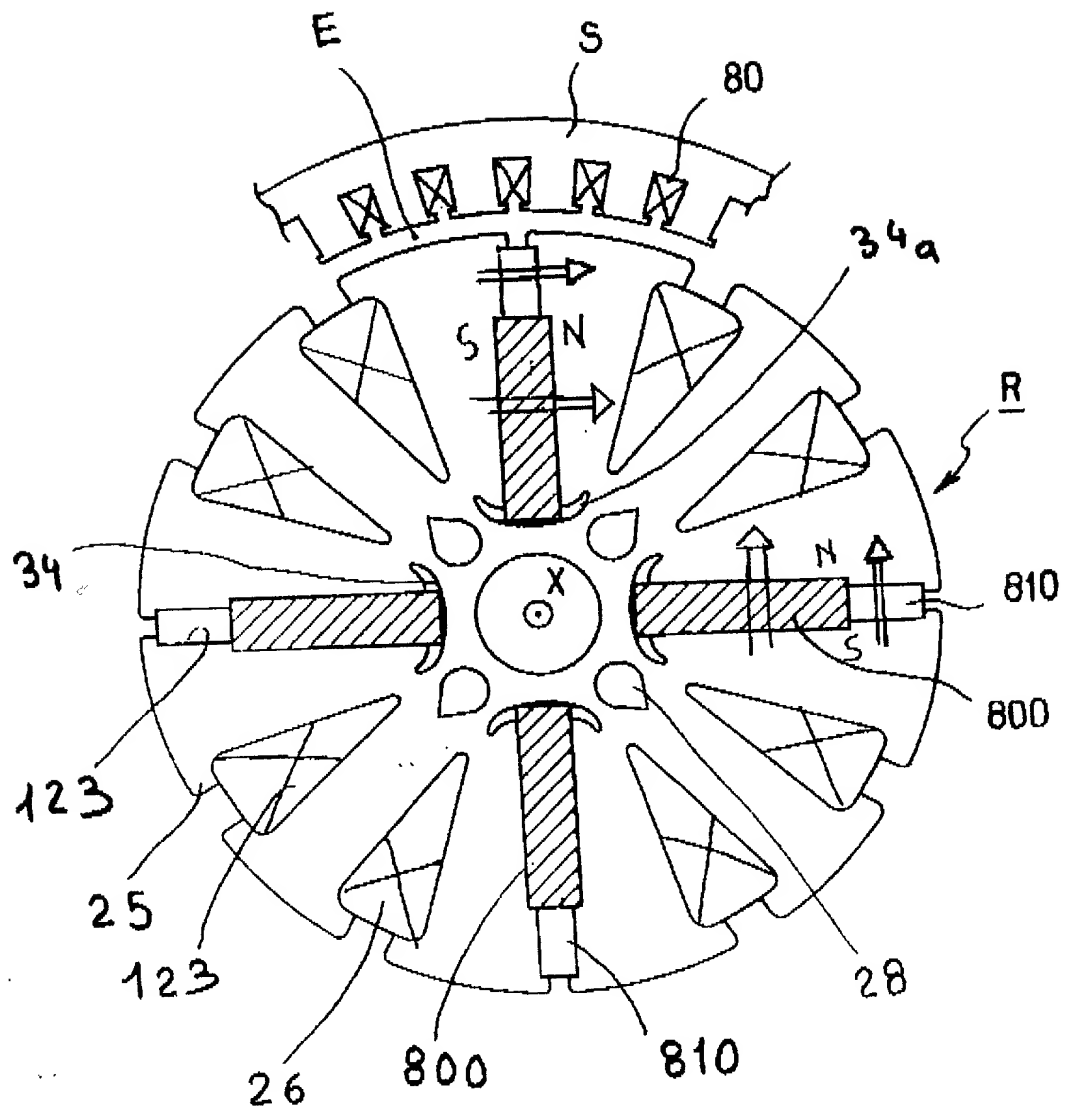
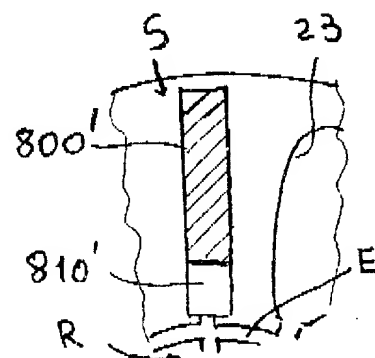
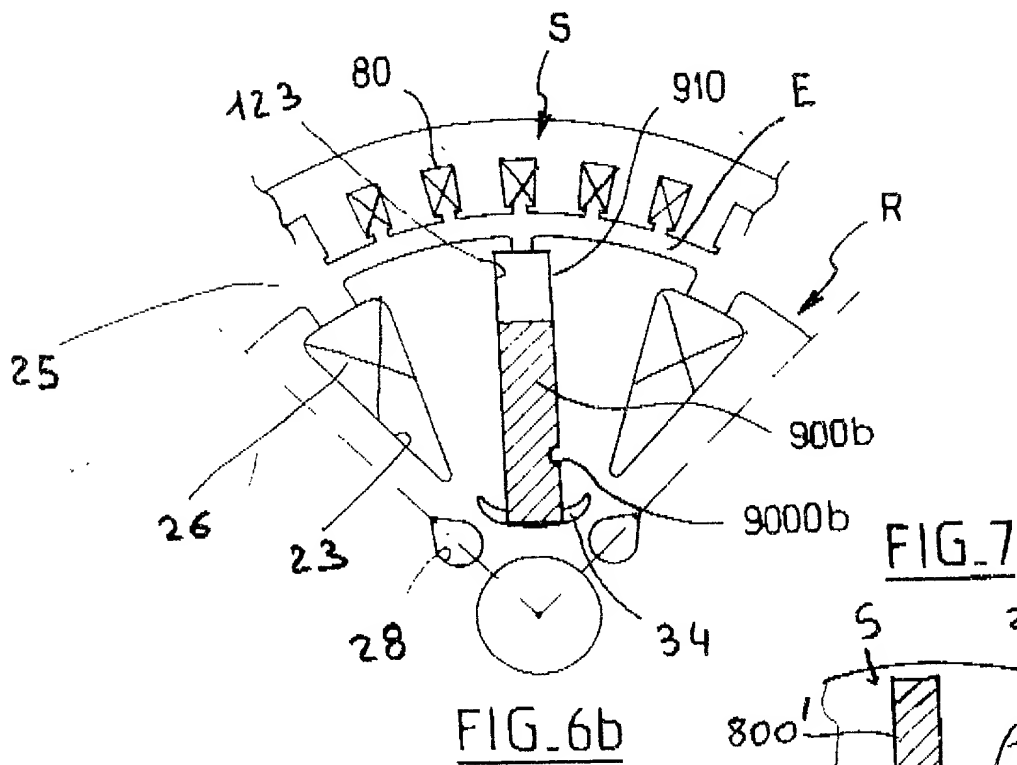
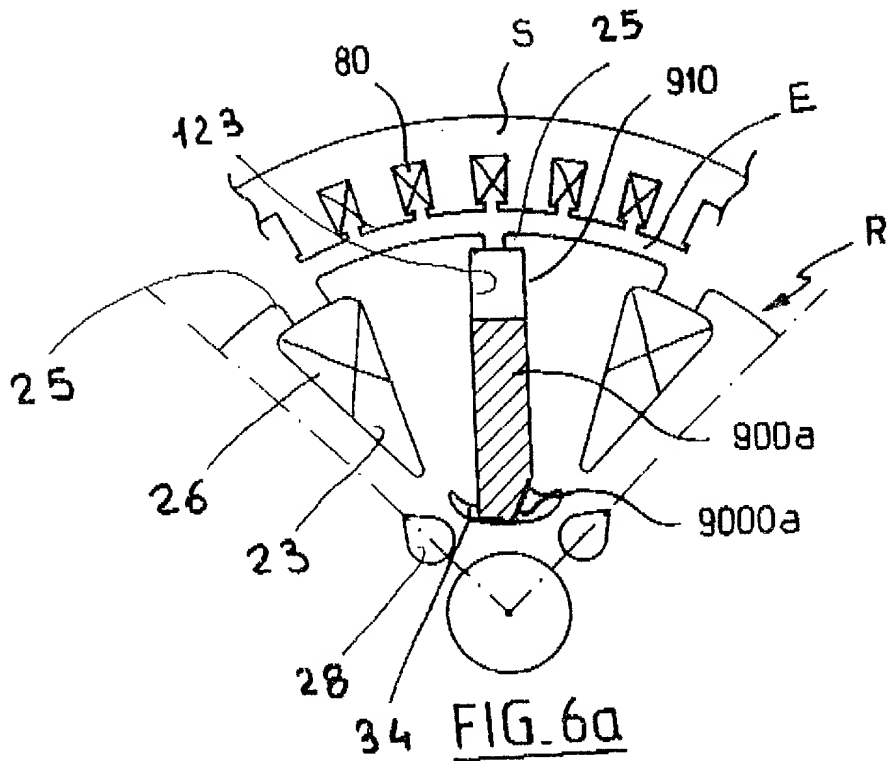


FIG. 5



RULE 63 (37 C.F.R. 1.63)
DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name, and I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled
ROTATING MACHINE COMPRISING MAGNETS WITH DIFFERENT COMPOSITIONS

the specification of which (CHECK applicable BOX(ES)).

☐ is attached hereto.

was filed on

as U.S. Application Serial Number

on **17 March 2000**

☒ was filed as PCT international Application Number **PCT/FR00/00650**

and (if applicable to U.S. or PCT Application) was amended on

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above, to the best of my ability. I acknowledge the duty to disclose information which is material to the examination of this application in accordance with 37 C.F.R. 1.56 as set forth on the reverse side hereof. I hereby claim foreign priority benefits under 35 U.S.C. 119/365 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date (1) before that of the application on which priority is claimed or (2) if no priority claimed, before the filing date of this application :

PRIOR FOREIGN APPLICATION(S)

Number	Country	Day/Month/Year Filed	Priority Claimed Yes - No
99.03519	FRANCE	22.03.1999	XX

I hereby claim the benefit under 35 U.S.C. 120/365 of all United States and PCT international applications listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in such prior applications in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose material information as defined in 37 C.F.R. 1.56 which occurred between the filing date of the prior applications and the national or PCT international filing date of this application :

PRIOR U.S. OR PCT APPLICATION(S)

Application Serial No.	Day/Month/Year filed	Status : Patented, Pending, Abandoned
PCT/FR00/00650	17/03/2000	Pending

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true ; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

And I hereby appoint

James R. Longacre Reg. No. 24,421, John M. White Reg. No. 32,634
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(to whom all communications are to be directed)

to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith and with the resulting patent.

1 -- 1) Inventor's Signature

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